

Digital Review Asia-Pacific Indonesia Chapter

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I. Overview

Indonesia, with the amount of citizen that was in the fourth largest population in the world (with 220 million people) consists of more than 1000 island, and has its own characteristic in developing its information and communication technology infrastructure. Even the government through the Presidential Decree No 6 Year 2001 about “Information and Communication Technology (ICT) Development and Usability in Indonesia” asserted that efforts to make the use of ICT optimal were really need to endeavor public and to unify the nation.

Because of that, the ICT teledensity rate in Indonesia, even it is expanding, it is still not enough. For fixed telephone lines teledensity, there are 13 million lines or about 6 lines for every 100 citizens (6%). On telecommunication industry, mobile telephone was growing rapidly. The average growth of cellular user in Indonesia since 1999 until 2005 is 63.7% per year. Until mid of 2006, penetration rate of cellular user in Indonesia were about 50 million people or about 22 million units for every 100 citizens (22%).

From National Social Economic Survey 2005 that held by National Statistic Bureau, they get fact that 7.7 million from 58.8 million households (13.11%) already had telephone in

their house, and 6.6 million of them are located in the city. Whereas, about 11.7 million household (19.9%) in Indonesia have cellular telephone with the biggest amount in the city, almost reached 9 million household. Averagely, every household has 1.9 cellular phone number or card.

And then about 2.2 million from total 58.8 million household (3.68%) had computer, 2 million of them are located in the city. From every 100 household that have computer (the total were about 0.6 million), only 27 who use it for accessing the internet.

According to ISP Association internet user in Indonesia, in 2006 there were about 20 million people or about 9 people for every 100 citizens (9%). On the period of 2000 – 2004, the average of internet user is 67%. And the amount of customer is much less, only 6 million people or not more than 2.7 people for every 100 citizens (2.7%). The strength to increase the internet penetration received more support when in January 2005 the government set free the use of 2.4 GHz and entrust the arrangement to the community independently. The uniqueness from the rising of ICT penetration in Indonesia is the existing of cyber café or internet kiosk (*warung internet* – warnet) that grew rapidly in many cities in Indonesia.

Now, estimated there are 4000 internet kiosk. If we look closer, averagely every internet kiosk has 10 computers that can be used by turns 6 shift a day (with assumption of utilization is 2 hours/computer and the internet kiosk open for 12 hours) so at least there are 240.000 shift (computer and internet), or about 1 shift (2 hours) for every 1000 people every day. And the internet kiosk will grow more rapidly because now they can use alternative Internet access which use 2.4 GHz wireless technology. Besides that, some of government regulations were start directly to strengthen ICT infrastructure development.

For example is the urge of Indonesian Telecommunications Regulatory Body (*Badan Regulasi Telekomunikasi Indonesia* - BRTI) in December 2003. It showed that the government willing to establish and conduct the regulations that related with telecommunications service and infrastructure transparently.

Efforts to keep down the cost of telecommunication and Internet bandwidth in Indonesia were still carried out. The plan of fiber-optic backbone development, the healthy competition increase in telecommunication business and the arrangement of frequency resources, at the end were expected to be enjoyed by all Indonesia citizens in a form of ICT that had good quality and affordable cost.

II. Technology Infrastructure

II.1. Satellite

At the year 1969, Indonesia has entered the global communication through the outer space by authenticated international earth station INTELSAT at Jatiluhur, 60 kilometers from Jakarta. In 1976, President Suharto named the first Indonesian Satellite with PALAPA. At that time, Indonesia was the third country who used satellite as their telecommunication infrastructure. 1976 was the beginning where every Indonesian citizen could watch the program from Indonesia Government Television Broadcasting (*Televisi Republik Indonesia* - TVRI). In the early of 1980, the presence of satellite made the automation of telephone went faster and distributed evenly, till the early 1990 that automation has distributed throughout the regency in Indonesia.

At early 1990, PT Telekomunikasi Indonesia (Telkom) had three satellites, then one satellite with it clients, PALAPA B2P, had a trans-management to PT Satelit Palapa Indonesia (Satelindo) and now operating by PT Indonesian Satellite Corporation (Indosat). In the same time, PT Telkom had stock and support satellite operator PT Pasifik Satelit Nusantara (PSN), Satelindo and another VSAT (Very Small Aperture Terminal) operator. After PT Telkom launched Telkom-2 satellite in November 2005, Indonesia still needs three to six additional satellites. This calculation made if we want to connect every region in Indonesia which is consist of 43.000 villages in one telecommunication infrastructure network. If every village were connected with 64 kbps transmission (2 voice channels and internet 32 kbps) through satellite, it will need three to six satellites with 24 transponder capacity.

After succeed operating Telkom-2 Satellite in Cibinong Main Control Station, West Java, now PT Telkom preparing the operation of Telkom-3 satellite that will be operate at 2009. Telkom-3 satellite will be the 10th Indonesia's satellite, whereas seven of them were counted to Palapa group. The first satellite, Palapa A1, was launched in July 9th 1976. After that Palapa A2 (March 11th 1977), Palapa B1 (June 16th 1983), Palapa B2 (February 26th 1984), Palapa B2P (March 1987), Palapa B2R (April 1990) and Palapa B4 (May 1992) was launched successively.

The era of satellite then entered the new chapter that is Telkom-1, launched August 1999, and Telkom-2 that launched in November 2005. Palapa B2 was the only one which failed to launch, because there were disruption in the promoter engine, so it replaced with Palapa B2P. Palapa B2 then re-launched in April 1990 with name B2R. Now there is five operator in Indonesia who operated five satellite, there were PT Indosat with Palapa C-1 in 113 orbit slot and Palapa C-4 in 150 orbit slot, PT Telkom with Palapa B-1 in 108 orbit slot and Palapa B-3 in 118 orbit slot, PT MediaCitra Indostar with Indostar in 107 orbit slot, PT PSN with Palapa Pasifik in 146 orbit slot, and PT Aces with Garuda-1 in 123 orbit slot.

II.2. Phone Service

According to information released by Indonesian Cellular Phone Association (*Asosiasi Telepon Selular Indonesia - ATSI*), in 2003 the amount of cell phone customer were 14.69 million numbers and in 2006 they estimated it will reach 65 million numbers, and in 2007 it will reached 60 million numbers. With 215 million citizens, the cellular teledensity reach more than 30%. Because one person may have more than one number, the net teledensity number approximately are about 20% - 22%.

II.2.a. 3G

Now cellular users in Indonesia can use the 3rd generation of telecommunication service (3G), at February 2006 the government officially choose three telecommunication operators as 3G providers through tender process. That three

operators completing the two operators which already had 3G license, there are PT Natrindo Telepon Selular (Natrindo) and Hutchison CP Telecommunications (formerly Cyber Access Communications) in October 2003.

Nevertheless, at least two new operators, Telkomsel and Excelcomindo (XL), actively build their 3G infrastructure in few big cities in Indonesia. Per October 2006, XL noted about 18,000 customers actively using 3G services. Whereas according to Telkomsel, there are 240.000 customers registered their 3G services.

These 3G services are commercially used in Indonesia on November 2006. Telkomsel, as a cellular operator who had the biggest cellular market in Indonesia already allocated about USD 300 million to build the 3G network. Otherwise, XL prepared about USD 50 – USD 100 million and Indosat were ready to invest USD 200 – USD 300 million for this.

Another interesting point is the share-holding structure from 3G operators in Indonesia, are majority owned by other countries. Singapore owned 41.94% of Indosat share through Singapore Technologies and Telemedia (STT), 35% of Telkomsel share owned by Singapore as well, using Singapore Telecommunication Ltd (SingTel). In fact, both majority of Singtel and STT shares are owned by Singapore state-owned corporate, Temasek Holding (Pte) Ltd. The join market between Indosat and Telkomsel will coverage around 80% GSM user in Indonesia.

On the other hands, XL also private company that share majority owned by Malaysia, by Indocel Holding Sdn Bhd for 59.67% of share and Khazanah Nasional Berhad for 16.81 of share. Cyber Access Communications, already sold 60% of its share to Hutchison CP Telecommunications from United States. And 51% of Natrindo share already sold to Maxis Communication Bhd from Malaysia.

II.2.b. Fixed Phone

- Exchange Capacity : 13,200,589 lines
 - Installed Lines : 13,169,617 lines
 - Subscriber Lines * : 12,333,541 lines
 - Public Phone (coin/card) : 91,849 lines
 - Phone Kiosk : 332,795 lines
- (* including Fixed Wireless Access / Telkom Flexi)

Department of Communication and Information Technology (*Departemen Komunikasi dan Informatika - Depkominfo*) in Universal Service Obligation (USO) program will targeting to provisioning telecommunication access and service in village area for about 43,000 village that has not reached by telecommunication network yet. Area determination plan was based on provisioning telecommunication access and service plan in USO program with a period from year 2006 till year 2010.

II.2.c. Fixed Wireless Access Phone

- PT Indosat (StarOne): 235,036 lines
- PT. Bakrie Telecom (Esia): 1,056,259 lines
- PT Telekomunikasi Indonesia (Flexi): 3,272,100 lines
- PT Batam Bintan Telekomunikasi: 2,878 lines

II.2.d. Mobile Phone / Cellular

The idea of unified access licensing for every telecommunication service starts to be discussed bustling lately in Indonesia. The telecommunication service they mean can be as united cellular service, fixed wireless access, Internet, and broadband service in one license.

The application of unified access licensing will give big influence in cellular service, fixed wireless access (FWA), and fixed wire access. If that license applied, the cellular operator could executed local fixed service while FWA operator had unlimited moving license. With unified access licensing the “frequency used right fee” (*Biaya Hak Penggunaan - BHP*) between FWA operator, cellular, and data communication operator or fiber optic will be same.

That kind of license was thrown by Indonesia Telecommunication Regulation Board (*Badan Regulasi Telekomunikasi Indonesia - BRTI*) and Department of ICT as an issue that will be consider to be apply in the future. Certainly, if unified access licensing applied in Indonesia public will get advantage from the fee and service competition between operators.

The number of mobile phone subscribers could describe bellow:

PT Telkomsel (Halo, Simpati, AS)	
i.	Prepaid Subscribers: 27,647,000 unit
ii.	Postpaid Subscribers: 1,471,000 unit
PT Indosat (Matrix, Mentari, IM3)	
i.	Prepaid Subscribers: 13,019,934 unit
ii.	Postpaid Subscribers: 676,407 unit
PT Excelcomindo Pratama (Xplor, Bebas, Jempol)	
i.	Prepaid Subscribers: 7,420,632 unit
ii.	Postpaid Subscribers: 176,194 unit
PT Mobile8 Telecom (Fren)	
i.	Prepaid Subscribers: 1,278,000 unit
ii.	Postpaid Subscribers: 50,000 unit
Sampoerna	
i.	Subscribers: 33,491 unit
Natrindo Telepon Seluler	
i.	Subscribers: 7,899 unit

Table 1.0 (Mobile Phone Subscriber)

Source:

- Performance of National Telecommunication 1995 – 2005, General Directorate of Post and Telecommunication, May 16th, 2006.
- List of Pre-Paid User Registered, General Directorate of Post and Telecommunication, September 20th, 2006.
- PT Telekomunikasi Indonesia Yearly Report, Year 2005.
- Mass Media (Bisnis Indonesia and www.detikinet.com)

II.2.e. Computer

According to Department of ICT, the PC ownership level in Indonesia was very low; it is 5 million units from about 220 million citizens in Indonesia. Whereas according to Indonesian Computer Business Association (*Asosiasi Pengusaha Komputer Indonesia - APKOMINDO*), PC growth sales in Indonesia reach 20% every year. In 2005, PC sales reached 1.2 million units, and in 2006 they predict it will reach 1.44 million units.

From that amount, 65% were local PC and 35% more were imported PC (built-up). Corporate sector, especially manufacturing and financing notes as the biggest consumer, it is about 30 – 35% from total market segment. Government comprises 25% consumer, retail sector and household comprise 10 -15%, and most of the rest were take by educational institutions. Based on IDC research, pronounced that small-medium enterprise (SME) sector is the biggest PC consumer, it was 34% followed by big company, government, household, and education.

II.2.f. Internet

According to Onno Purbo, Indonesia ICT expert, the cost for Internet bandwidth in Indonesia nowadays is about USD 3,000 per Mbps a month. Directorate General of Post and Telecommunication of Indonesia recently said that bandwidth cost around USD 5.07 per 100 Kbps. It explained why Internet fee in Indonesia for every kind connection were so expensive. Indonesia ISP Association explained that cost for every 1 Mbps if the bandwidth taken from other country satellite is around USD 3,000 to USD 4,000. Meanwhile, it cost will very expensive, up to USD 6,000, if bandwidth taken from local operator (Network Access Provider – NAP). Indonesia has 36 NAP that have legal permit from General Directorate of Post and Telecommunications (*Direktorat Jenderal Pos dan Telekomunikasi - Dirjen Postel*).

So, the biggest component which makes the fee expensive is the fee for international backbone connection and local backbone access to local Network Access Provider (NAP) network. This cost 60% - 80% from total Internet Service Provider (ISP) outcome in a month. Actually the ISP could use other NAP, include from abroad (other country), whereas the price were cheaper. But there is governmental regulation that required the ISP to buy bandwidth only from local NAP.

Recently, Dirjen Postel will put a policy about arrangement of minimum international bandwidth service application in implementing NAP service. Basically NAP implementation should be able to supply bandwidth for ISP needs in Indonesia with relatively low price. The International bandwidth price can be reduced if NAP operator has bargaining position with foreign hub owner to get cheaper price.

To get that bargaining position, the amount of International bandwidth purchasing should be significant, not least than 45 Mbps. So that it needs a minimum bandwidth arrangement provide by NAP service operator. NAP also ordered not to provide bandwidth to end-user directly, such as corporate or retailer. NAP may provide bandwidth for ISPs consumption only. So therefore, ISPs do their jobs to serve end-user.

Speaking about national Internet backbone, according to department of ICT, the fiber-optic network that available is only 12,000 kilometers. To serve all islands in Indonesia, at least it need 35,000 kilometers fiber-optic network. The government has declared a fiber-optic network development project called Palapa Ring.

This backbone communication network development project's value is USD 500 million – USD 1 billion. Palapa Ring is undersea cable network in integrated ring shape spread out from Sumatra to West Papua. It is 25,000 kilometers length. Every ring will transmit broadband access from one point to another point in every area. This access will support high speed broadband fiber-optic network with 300 Gbps – 10,000 Gbps capacity in that area.

Hopefully, this Palapa Ring backbone network would make the telecommunication and internet cost much cheaper. Minister of Department Communication and Information Technology, Sofyan Djalil, has target that in the mid of 2007 Internet fee in Indonesia will be as cheap as in Singapore.

II.2.f.i. IP Addresses

The development of Internet Protocol (IP) Address that allocated for Internet in Indonesia could describe below:

Year	IPv4 Accumulative (block)	IPv6 Accumulative (block)
1999	256	-
2000	1,072	-
2001	1,553	-
2002	2,455	-
2003	2,505	131,073
2004	2,635	131,073
2005	3,175	262,145
2006*	3,215	262,145

Table No. 2. (IP Address Resources. Source: Indonesia ISP Association)

The IP growth number above describes the ISP service growth or customer network in Indonesia. Because the definition of ISP here is entity which autonomously operated the network using TCP/IP and also had



their own allocated IP address (Allocated Portable) from Internet Registry such as Asia-Pacific Network Information Center (APNIC) and American Registry for Internet Numbers (ARIN) or from other IP which already had Allocated IP Address. Every ISP or customer network who request IP should be member of Indonesia ISP Association and fulfill both of technically and administrative requirement.

For example, every ISP who will request IPv4 to APNIC will allocated for about /20 or 4096 address. Every customer network who requested IPv6 to APNIC will be allocated for about /32 or 65536*/48. Then, before they ask for next additional IP, ISP or customer network should show their former utility assignment were 80% used and that former assignment already registered in APNIC “whose”. In otherwise they also give the information about the device which needs IP address along with the network diagram.

Per end of September 2006 at least there are 17 commercial ISP in Indonesia that implemented IPv6. Those 17 ISP already allocated their IP Peer to Peer (P2P) to connected in National Interconnection Exchange (NICE) / Open Internet Exchange Point Indonesia (Appendix)

II.2.f.ii. National Internet Exchange

With this two national interconnection which called as Indonesia Internet exchange (IIX) and National Interconnection Exchange (NICE) speed of information traffic inter ISP in Indonesia no longer depended to international internet interconnection. Along with the development of internet and its support technology, IIX and NICE will continue raise their ability, either in function or capacity.

II.2.f.iii. Subscriber and User

The table below is an official estimation from Indonesia ISP Association (*Asosiasi Penyelenggara Jasa Internet Indonesia – APJII*) about the amount of Internet subscriber and user all this time till the end of 2006.

Year	Subscriber	User
1998	134,000	512,000
1999	256,000	1,000,000
2000	400,000	1,900,000
2001	581,000	4,200,000
2002	667,002	4,500,000
2003	865,706	8,080,534
2004	1,087,428	11,226,143
2005	1,500,000	16,000,000
2006	6,000,000	20,000,000

Table No. 3. (Internet Subscriber & User. Source: Indonesia ISP Association)

Generally the subscriber growth amount was so much less than the user growth. This can be understandable, because based on some latest reputable research, most of Internet user in Indonesia accessing internet from their office or internet kiosk. Other obstacle is the last-mile technology which cheap-merry, either wire or wireless was not spread widely yet.

In fact, for home user, there are some choices to get the Internet access. It could be dial-up, wireless, ADSL or cable. The last two only provided in a small coverage, especially in a big city. For Internet dial-up, user may choose Telkom's ISP TelkomNet Instan, which has a nationwide dial number and charger IDR 160 per minute (US 1.6 cents), includes the telephone usage charge. The other model is a regular ISP plan to which telephone usage charges apply. The prices basically work out the same, but still relatively high considering the low levels income in the country. So people tend to use Internet Kiosks. The price is cheaper, only IDR 3000 per hour (USD 0.3).

II.2.f.iv. Internet Traffic

If we notice the MRTG (Multi Router Traffic Graph) Reports which manage by IIX administrator, we can conclude that in one year last the national Internet traffic were highly raised.

	Feb 1999	Jan 2000	May 2001	Mar 2002	Mar 2003	Des 2003	Jan 2005	Mid 2006
Peak	2.05 Mbps	3.07 Mbps	40.96 Mbps	245.760 Mbps	620.595 Mbps	1.2 Gbps	1.5 Gbps	2.1 Gbps

Table 3.0 (Peak Traffic IIX. Source: APJII)

II.2.f.iv. Domain Name

Nowadays there are about 20,000 third-level domains under country-code Top Level Domain (cc-TLD) .id. That amount were reached within eight years with the biggest composition (almost 90%) are company user who used second-level domain co.id. Averagely there were about 1000 new domain name registered every month. SLD that used in Indonesia are: ac.id (high education, D-1 minimal), co.id (company with legal institution), go.id (government), mil.id (military), net.id (licensed telecommunication provider), or.id (foundation, organization, community), sch.id (basic or secondary education), war.net.id (internet kiosk), and web.id (personal or organization).

II.2.f.v. Wireless and WiMax

According to Association of Wireless-LAN Internet Indonesia (IndoWLI), along this 2006 the use of 2.4 GHz frequency had grew till 70% than last year, when the license of that frequency has just released and hand over to public for its arrangement and coordination.

Nevertheless, according to IndoWLI, more than 50% of 2.4 GHz user in all over Indonesia has disobeyed the regulations. Most of them are government institution and big company with state-owned corporate categories. The violation that they usually do is using power over its maximum limit, uncertified radio, refusal of frequency arrangement by community. But the Directorate General Post and Telecommunication together with IndoWLI still keep on to up hold the regulations which related with the use of 2.4 GHz frequency.

On the other side, currently the government and Indonesia Telecommunication Regulatory Body (*Badan Regulasi Telekomunikasi Indonesia* - BRTI) were still considering about the frequency allocation to use by Broadband Wireless Access (BWA), also known as WiMax, versus satellite. PT Telkom as one of satellite operator in Indonesia does not want frequency on 3.5 GHz used by BWA, they afraid it will cause interference. And they also state that 3.4 GHz were suitable for satellite in S-Band and C-band extended because Indonesia has tropic climate with high rainfall. Indonesia as an islands country, made satellite considered as an absolute need for telecommunication. And 3.4 GHz frequency considered as fixed satellite service that can not be divided for WiMax use.

But Indonesia Broadband Wireless Association (Abwindo) and all WiMax vendors ask for frequency that can be use in 3.5 GHz. For some reasons, based on economic scale it will be cheaper if WiMax developed in 3.5 GHz than in alternative frequency such as 5.8 GHz, which only applicable in US. WiMax Forum is also already do certification for equipment produced by vendor which is work in 3.5 GHz frequency. WiMax with 50 km reach were expected to be in position to substitute the Digital Subscriber Line (DSL). All this time BWA in 3.5 GHz frequency were not break up the regulations and legally has permit from Directorate General of Post and Telecommunication.

Actually, beside Telkom-1 satellite, there is also Palapa C-3400 satellite on 3.5 GHz until 3700 MHz. But, some BWA operator such as PT Aplikanusa Lintasarta, PT Corbec Communication, PT Jasnikom Gemanusa, PT Reka Jasa Akses, PT Citra Sari Makmur and PT Indosat use 3.5 GHz as well.

The government is still trying so that 3.5 GHz frequency could be use together between WiMax and satellite. But if there is no agreement, the government will take the satellite in the first place as the primary occupant in 3.5 GHz frequency and relocated BWA to other frequency. If this happen, the BWA operator will enforce the government to provide compensation, such as investment cost compensation for the cost that already used for BWA infrastructure supplied in 3.5 GHz.

Box / Feature

Beginning of Internet in Indonesia (In a Glance)

In 1984 some of information network in Indonesia start connected to internet through UI-net network. UI-net still classified as University of Indonesia (UI) internal network that connected through UU-net. Two years later UI-net success connected big universities in Indonesia. This first huge Indonesia network was connected to the world big computer networks. Even the ARPANET networks which will be the initial of internet were connected at that time.

UI-net connected to UU-net using low speed modem, 300 bps. In ITB, activity of ITB *Amateur Radio Club* (ARC) in 1986 has contributed to the history of the operation of internet network in Indonesia. This internet network was build with Apple II computer, using amateur radio link as communication network. Radio

Rig HF SSB Kenwood TS430 tools used as inter computer transmission tools. This early 1990 communication data packet radio on 70 cm band and 2 m still developed widely. PC 386 run NOS program on DOS operation system which was used as TCP/IP gateway packet radio.

Finally in 1995 PT Telkom through its Research and Technology Division gave 14.4 leased line connections as part of IPTEKNET. This connection ends the 1200 bps packet radio technology which already being as an internet backbone for several years before. In September 1996, ITB connected to Asia Internet Interconnection Initiatives (AI3) network. Internet bandwidth were added till 1,5 Mbps to Japan and keep added with connection to ISP TelkomNet and Indonesia Internet eXchange (IIX) about 2 Mbps. Actually, since 1993 Indonesia officially joined to Internet. World Internet Association (IANA) officially gave domain .id for the computer network in Indonesia. This year was also a milestone for the use of Internet network through TCP/IP protocol in Indonesia because since 1984 we used UUC as protocol. In 1994 the first legal Internet Service Provider (ISP) in Indonesia come up, IndoNet (www.indo.net.id). In March 1994 this ISP reached 28 cities in Java, Bali, Sumatra, Borneo and Western Lesser Sundas (NTB).

“Teknologi Informasi, Pilar Bangsa Indonesia Bangkit” (Information Technology, The Pillars for Indonesia Awakening) book by Ministry of Communication and Information – 2003, mentioned that in 1996 Indonesia ISP Association made up. In the same year some dial up Internet provider showed up with 33.6 Kbps access. And in 1997 these Internet provider starts to rise from 33.6 Kbps to 56 Kbps average. Other notes, at 1993 government ISP IptekNet website (www.iptek.net.id) become the first website that officially connected with Internet. In 1995, Department of Public Work (*Departemen Pekerjaan Umum - DPU*) note as the first government instance which go on line (www.pu.go.id). And in 1998 Samarinda regional government was the first regional government which had website in Internet (www.samarinda.go.id).

III. Key Institution Related to ICT

There are some institutions in Indonesia that had relation with information and communication technology (ICT) development. Generally, those institutions were divided to three criteria that are regulator, industry, and civil society. The relations between government institution, industry agent and public are really significant in developing ICT in Indonesia. For example, before formulating some policies, the first step frequently started with intensive and constructive dialogue among them. In general, there are so many parts that has role in developing ICT in Indonesia. Just for description, there are nine institutions, described below, which in some cases often sit together discussed many issues and material about ICT direction and policies in Indonesia.

National ICT Council

President Susilo Bambang Yudhoyono officially declared the formation of National Information Communication and Technology Council at Bogor Palace, Monday (11/13/2006). The general duties of National ICT Council are formulating the general policies and the direction of strategic development throughout the empowerment of ICT.

On more specific side, the duty of National ICT Council is to do national coordination on ICT area, which covers government agencies in local and central area, state-owned company and local-state-owned company, ICT communities, entrepreneur, professional institutes and general public. Besides that, the council also has authorities to give agreement on implementation of ICT programs across departments, so that they could use facilities that each institution has.

The National ICT Council was authorized by Presidential Decree No. 20 Year 2006 dated on November 11th, 2006. The Council has three years to accomplish their duties. On the organization structure, President Susilo Bambang Yudhoyono sits as Steering Committee, with Coordinating Minister of Economy.

Chairman on Duty is the Minister of ICT alongside 10 ministers or ministerial level officer. There are Minister of Finance, Minister of Justice and Human Rights, Minister of Industry, Minister of National Education, Minister of Home Affairs, Minister of Trade, State Minister of Planning and National Development / Chairperson of The National Development Planning Agency, State Minister of the Empowerment of State Apparatus, State Minister of the Research and Technology and Cabinet Secretary.

There is also the Implementation Team which includes Minister of ICT (ex. Officio) as chairman and consists of member which includes the expertise on ICT area. As for the Advisor Team, consists of member who was pointed directly; heads of universities in Indonesia that are Bandung Institute of Technology, University of Indonesia, Sepuluh November Institute of Technology and Gadjah Mada University.

As for Partner Team, it consist of all parties who actively participates in ICT industry, such as association, entrepreneurs, vendors, industrialists, technology owners and others.

Regulator / Government

1. General Directorate of Post and Telecommunication (Dirjen Postel)

General Directorate of Post and Telecommunication (*Direktorat Jenderal Pos dan Telekomunikasi – Dirjen Postel*) which is under the scope of Department of Communication and ICT together with Indonesia Telecommunication Regulatory Body (*Badan Regulasi Telekomunikasi Indonesia - BRTI*) has assignment to make and implementing the regulations and standardize the technical of post and telecommunication. And it also includes Directorate of Telecommunication, Directorate of Radio Frequency Spectrum Satellite Orbit, Directorate of Post and Telecommunication Standardize, and Directorate of International Post and Telecommunication Institutional. Website: www.postel.go.id

2. **Indonesia Telecommunication Regulatory Body (BRTI)**

Indonesia Telecommunication Regulatory Body (*Badan Regulasi Telekomunikasi Indonesia* – BRTI) is an independent regulatory body (IRB) that aimed to protect public interest (telecommunication user) and to support and protect telecommunication business competition so it will be health, efficient, and can attract more investors. In doing it functions, BRTI coordinate with Postel and give report to the Minister of Department of Communication and ICT. Website: www.brti.or.id

3. **Ministry of Research and Technology** (Kementerian Ristek)

One of the main programs from **Ministry of Research and Technology** (*Kementerian Riset dan Teknologi*) is on developing ICT which directed to ICT infrastructure expansion. So ICT can reach every social aspects, raise the economy activity by applied ICT solution, industry competition, trading efficiency, public services and social quality of life effectiveness. Main priority also include the telecommunication development, internet, save energy and low price computer; authorize the digital technology; and develop application which bassist on open source. Website: www.ristek.go.id

Industry / Business

4. **Indonesia Infocomm Society (MASTEL)**

Indonesia Infocomm Society (*Masyarakat Telematika* – MASTEL) is a non-profit institution which had function as a bridge for government, devotee and ICT people. Work scope of MASTEL are telecommunication aspect, multimedia and information technology. Now MASTEL were supported by about 12 association in ICT sector. Further more, MASTEL has 63 company members, about 215 personal members, 27 unprofit members, and 14 MASTEL special members. Website: www.mastel.or.id



5. **Indonesia Information Technology Federation (FTII)**

Indonesia Information Technology Federation (*Federasi Teknologi Informasi Indonesia* - FTII) is an organization consist of some associations on ICT-related and other field which compliance with the aim of federation, which is striving for industrial development and raising up information technology application more wide, integrated and effective. Website: www.ftii.or.id

6. **Indonesia ISP Association (APJII)**

Indonesia ISP Association (*Asosiasi Penyelenggara Jasa Internet Indonesia* - APJII) becomes the umbrella institution for some Internet Service Provider (ISP) with some strategic key program for developing Internet network in Indonesia. Few things that related to its program are Internet service fee, management of Indonesia-Network Information (ID-INC) and Indonesia Internet eXchange (IIX), and negotiation of telecommunication service infrastructure fee. APJII also serve its member in Network Information Resources (NIR), give advice to government, and organize seminar or training. Website: www.apjii.or.id

Civil Society / Consumer

7. **Air Putih Foundation** (Air Putih)

At the beginning, **Air Putih Foundation** is a group of humanity volunteer with ICT based-knowledge who want to open the communication isolation in Nangroe Aceh Darrusalam when Tsunami happened in the end of 2004. After turn into a foundation, now Air Putih focusing as ICT Emergency Response Team that assign to be mediator and accelerate the distribution of information for every person who involves in handling disaster in certain area. Website: www.airputih.or.id

8. Indonesia Telecommunication Users Group (IDTUG)

Indonesia Telecommunication Users Group (IDTUG) is an independent organization move in telecommunication advocate. It functions as a bridge between consumer, operator, and government for better telecommunication service in Indonesia. IDTUG straightly affiliate to International Telecommunications Users Group (INTUG), an international association of telecommunications users located in Belgian. Website: www.idtug.net

9. Center for ICT Studies Foundation (ICT Watch)

Center for ICT Studies Foundation often involved in much humanity effort programs in ICT field. Some programs for example were Society Self-supporting Computer Laboratory for middle to below class society, Health Internet campaign program, ICT socialization in regions in Indonesia facilitated by many party. Also known as ICT Watch, this foundation also does many communication program (campaign) and researches about condition of ICT on some aspects in Indonesia. Website: www.ictwatch.com

Others

Beside that, below this are few Associations that supervise some of industry agents. These Associations do its act to struggle their member needs. Coordinate with government and also socialize the program to public, are some programs that identically they often done.

- ICT Business Software Association of Indonesia (ASPILUKI – Asosiasi Piranti Lunak Telematika Indonesia)
- Business Computer Association of Indonesia (APKOMINDO – Asosiasi Pengusaha Komputer Indonesia)
- **Higher Education on Information Technology and Computer Association (APTIKOM – Asosiasi Perguruan Tinggi Informatika dan Komputer)**
- Internet Kiosk Association of Indonesia (AWARI – Asosiasi Warung Internet Indonesia)
- Wireless LAN Internet Association of Indonesia (IndoWLI – Indonesia Wireless LAN Internet)

- Cellular Provider Association of Indonesia (ATSI – Asosiasi Telepon Selular Indonesia)
- Broadband Wireless Association of Indonesia (ABWINDO – Asosiasi Broadband Wireless Indonesia)
- Satellite Association of Indonesia (ASSI – Asosiasi Satelit Indonesia)
- Telephone Kiosk Association of Indonesia (APWI – Asosiasi Pengusaha Warung Telepon Indonesia)
- Association of Telecommunication National Company Association (APNATEL – Asosiasi Perusahaan Nasional Telekomunikasi)
- Association of Community of Internet Center (APW Komitel – Asosiasi Pengusaha Warnet Komunitas Telematika)

IV. Digital Content Initiative Undertaken by The Country

As guidance either for central or local government institution in making use of ICT, especially those related to digital content distribution through the internet, Department of Communication and ICT has published some guidance. There are Government Infrastructure Development Portal Guidance, Making Local Government Website Guidance, Management of Electronic Document System Guidance, and Compose e-Government Development Master Plan Guidance.

According the latest data from Department of Communication and ICT, there are about 472 province and regency / city. Only 48% from that amount who had website, it means only 225 institutions.

Beside that, regularly, a national magazine *Warta Ekonomi* held e-Government Award every year. Its targets are government institutions such as Regency/City Administration, Province Administration, Department and Non-Department Government Institution. Those institutions were evaluated base on criteria: a. changing process, b. leadership, c. e-Government investment strategy, d. coordination between the institution with other party, e. focus in social services. At this stage they also evaluate the government institution official website, base on criteria: a. institution identity, b. website design, c. website contents, d. website facility, e. website feature, f. respond test.

The winner in 2005, which is the 4th series, the winner for every category are: Yogyakarta – www.jogja.go.id (Regency/City Administrations), East Java – www.jatim.go.id (Province Administration), Department of Public Works – www.pu.go.id (Department), and Institution of National Survey and Mapping Coordination – www.bakosurtanal.go.id (Non-Department Government Institution).

Besides the data above, Indonesia ICT Institute also published info-metric rank which is government institution website research result in Indonesia. The scale criteria been used are web size, in-link, self-link, and web impact factor. And the top ten for government website type are: DKI Jakarta Province website (www.jakarta.go.id), Surabaya City Administration – East Java (www.surabaya.go.id), East Java Province (www.jatim.go.id), Bali Province (www.bali.go.id), Indonesian Bank (www.bi.go.id), Department of Industry and Commerce (www.dprin.go.id), Bantul Regency Administration – Yogyakarta (www.bantul.go.id), and West Kalimantan Province (www.kalbar.go.id).

Officially, Indonesia also has a national portal. The address is www.indonesia.go.id, it contains basic information about Indonesia, managed by Secretary of State together with Department of Communication and ICT. President Susilo Bambang Yudhoyono (SBY) also has an official website, www.presidensby.info. There is a little debate between ICT people about ‘PresidenSBY’ as the website’s name they thought it was not formal name for presidential website.

And about the domain ‘.info’ selection, where usually for an official website they used the official state domain that is ‘.go.id’. This website were contain all about the agenda, activity and documentation of SBY as a President, managed seriously by the Presidential Spoke Person Office, involving independently editorial team.

Not only that, in www.presidensby.info, beside the English section it also provided with other feature such as info services through SMS, audio streaming, Pod cast feed and syndicates news through RSS. Launched at February 2006, it costs IDR 84 million (USD 8,400) to make this website, and the monthly cost were about IDR 42 million (USD 4,200).

V. Online Services Available and Accessible

Actually there are so many online services that can be accessed by public. Like e-banking service such as for BCA clients (www.klikbca.com) and Bank Mandiri (www.bankmandiri.co.id). All sorts of banking transaction can be done through Internet. Beside that, some university such as Bina Nusantara University (www.binus.ac.id) already integrated their management system and study material online. So, both of lecturer and students could use the ICT facility optimally. And nowadays there are so many e-Commerce websites. Some of them were considered superior such as computer ware store website, Bhinneka (www.bhinneka.com), and tour services website, Indo.com (www.indo.com).

And now we can buy airplane ticket through Internet, like in Air Asia (www.airasia.com) and Adam Air (www.flyadamair.com). And now treasuring business information or company were so much easier because there is Yellow Pages service in Internet (www.yellowpages.co.id). To read daily news, one of the main references for Internet users is online media website such as Detikcom (www.detik.com), Kompas (www.kompas.com) and Bisnis Indonesia (www.bisnis.co.id).

Box / Feature

Tax Directorate Serves Tax Payer Better Through IT

Tax Information System (*Sistim Informasi Pajak - SIP*) is the ‘oldest’ application in Directorate General of Tax area, already used since 1990. Gradually, this SIP application will be minimize and will turn into the newer applications. The newer applications in Directorate General of Tax are Integrated Tax Application System (*Sistim Aplikasi Pajak Terpadu - SAPT*) and Directorate General of Tax Information System (*Sistim Informasi Direktorat Jenderal Pajak - SIDJP*).

SAPT were used for Tax Area Office which handle Big Tax Obligator (*Wajib Pajak Besar*). In other side, SIDJP were used in Specifically Tax Area Bureau which handle specifically Tax Obligator such as state-owned corporation, Foreign Institution or Expatriate, Foreign Investment, and Company Exchange. Both of those applications had just start to use in Jakarta. For other area they still use SIP.

According to some articles at **KlikPajak.com**, the information portal about Indonesia taxations, the application of those information systems in Directorate General of Tax gave many benefits. One of it is early warning about tax obligator who has not fulfilled their obligation. That warning system also informed to the related tax obligator. As described, a warning mail automatically will be sent to tax obligator if they have not send Tax Payment Announcement Mail after specific dates. Other applications that Directorate General of Tax also had are e-filing and e-registration application. Both of those applications could also connect to SAPT, SIDJP, and SIP through software bridges.

The used of Information Technology (IT) by Directorate General of Tax already increased tax income. According to Taxation Director General, Hadi Purnomo, since 2001 Directorate General of Tax uses IT that connected with internet access. As a result,

income tax from 2001 to 2004 reached about IDR 660 quintillion. That were much more than tax amount over 30 years before internet access used, it is about IDR 600 quintillion. Some of that IT implementation was applied in connecting between the necessities to know Yearly Announcement Mail (*Surat Pemberitahuan Tahunan - SPT*) with Tax Obligator ID Number (*Nomor Pokok Wajib Pajak - NPWP*).

Nowadays they already implement tax obligator registration through internet (e-Registration / e-Reg). Include filling (e-SPT) and sending (e-Filling) period SPT and yearly SPT through internet. And tax payer now can pay the tax through any payment channel, including e-banking.

And so, tax payer can enjoy the benefit of e-government such as better service. The information available 24 hours, 7 days a week, without waiting the tax service bureau opened. We could find the information from office, home, without physically come to government office. Hadi said with this IT implementation, if there is tax obligator store less than it should, this will be directly notice. And he also notes, from the taxation side the IT implementation made all taxation process more simple, quick, and cheaper.

VI. ICT and ICT related industry

Through the National Industry Development Policy, the government already established it until the year 2020. One of the priorities is developing future industry group that includes ICT industry. The main potential of this industry concentrated in Java Island, some other were spread in some area like Batam, Bali, Medan, and Makassar.

In Indonesia, ICT market sector notes about USD 1.7 billion with the growth in 2005 about 22.1%. From that amount about USD 0.5 billion – USD 0.75 billion were estimate spared by banking sector.

VI. 1. ICT Industry

Especially for software industry, now there were about 200 software house commonly concentrated in Jakarta, Bandung, Surabaya, and Medan. Some of the products are: application in finance, geographical information system (GIS), inventory system, executive information system, office automation, animation, multimedia presentation, intranet/internet, LAN –WAN integrated, and consultant services.

Generally, according to the Department of Industry the population of ICT industry in Indonesia for 2006 mentioned below:

	Type	Amount
Computer Industry	Middle and big Scale	50 companies
	Small Scale	5000 assemblers
Software Industry	Middle and big Scale	154 companies
	Small Scale	214 companies
Telecommunication tools Industry		12 companies
Animation industry		150 companies

Table 4.0 (Population of ICT Industry. Source: Depperin)

According to data from General Directorate of Intellectual Property Rights, from 2002 to 2005, the total application for registration Indonesia's software copyrights only 133. While in this 2006, until August there are 104 software copyrights registration. It's all because software industry still does not understand about the IPR function. In other side, people in this industry often think that IPR registration as part from the cost.

VI. 2. Internet Service Provider

Indonesia Internet Service Provider Association (*Asosiasi Penyelenggara Jaringan Internet Indonesia - APJII*) was founded on May 1996. APJII made a national interconnection among Internet Service Provider (ISP) in Indonesia, so client from one ISP can communicated to other ISP client in different area in Indonesia easily and also with low price. Every ISP or customer network who request IP should be member of APJII and fulfill both of technically and administrative requirement.

Government through the General Directorate of Post and Telecommunication (*Direktorat Jenderal Pos dan Telekomunikasi - Ditjen Postel*) already published implementation permits which related to Internet services. The amount of the permits mention below:

	1999	2000	2001	2002	2003	2004	2005
Permit	50	139	172	180	190	228	232

Table 5.0 (ISP Permit Published. Source: Ditjen Postel)

From the amount of companies which get the permit, the ISP which already registered as APJII mention below:

	1999	2000	2001	2002	2003	2004	2005
ISP	39	74	104	121	117	119	232

Table 6.0 (APJII Members. Source: APJII)

Not every company which already gets the permits registers as APJII Member directly. Most of company who already registered as APJII Member was the company who needs either service or rights as APJII Member, such as IP Address allocation and connection to Indonesia Internet Exchange (IIX).

The status of member who already registered at APJII mention in the table below:

	1999	2000	2001	2002	2003	2004	2005
Member	40	78	114	136	130	137	281
Operational	35	63	82	90	93	110	134
Connected to IIX	12	24	49	70	78	99	25

Table 7.0 (Member Registered Status. Source: APJII)

According to APJII, even there are more than hundred ISPs in Indonesia that already operational, it is only 50 providers that run the business well and profitable.

VI. 3. Internet Kiosk

Indonesian Internet Kiosks / Cyber Cafe Association (*Asosiasi Warnet Indonesia / AWARI*) assume there were about 2500 internet kiosks and manage individually, not including internet kiosk that managed by schools or universities. Whereas the Association of Internet Center Community (*Asosiasi Pengusaha Warnet Komunitas Telematika / APW Komitel*) assume there were total 5000 internet kiosk in Indonesia nowadays.

According to the research conducted by ICT Watch (www.ictwatch.com) in September 2003 about “Internet Kiosk Condition in Indonesia”, in general internet kiosk has not been a business that really profitable. Many internet kiosks still operate because subsidized by other side business or just as hobby from the owner. It was not include other problem that continuously whipped internet kiosk, such as the price of internet bandwidth which is expensive, being target of apparatus person that will end with extortion, and using internet kiosk for immoral things (pornography) also for cyber crime.

To reach Internet backbone lane an internet kiosk needs at least 35 separately connections (hops). It will cause a bunch of cost that should be carried by internet kiosk. For having a proper bandwidth, an internet kiosk at least should pay about IDR 4 million a month. So only an internet kiosk with minimum 10-20 PCs, with fare about IDR 3000 – IDR 5000 (USD 0.3 – USD 0.5) per hour and located around campus could run profitable.

VI. 4. Indonesia Security Incident Responses Team on Internet Infrastructure (ID-SIRTII)

This Indonesia Security Incident Responses Team on Internet Infrastructure (ID-SIRTII) is a follow-up from Minister of Department of Communication and Information Technology Decree on September 2006 about Security of Used Telecommunication Network Based Internet Protocol. This mean to support the using of telecommunication based on internet protocol which relative free from threat and annoyance.

And the aim of this Security of Used Telecommunication Network Based Internet Protocol is for:

- Carried out the support in law enforcement process
- Created a safely using of telecommunication network based on internet protocol
- Carried out the coordination between both of local and foreign part.

The scope of ID-SIRTII team in pacifying the used of telecommunication network based on internet protocol are: do a socialization for every involved part to do the pacify activity in telecommunication network based on internet protocol used, do monitoring, early detection and early warn at threat and annoyance in telecommunication network based on internet protocol used in Indonesia; build up and or serving, operating, maintaining and developing database system monitoring and pacify the used of telecommunication network based on internet protocol at least to: support the ID-SIRTII activity, storing log file, and supporting law enforcement process.

Also related with ID-SIRTII Team, this institute consist of Director Team, consist of Central Bank, associations, Academism, ICT experts, Police, Prosecution, and so on, the member was so vary and independent. The Direction Team has to help the Minister of Communication and Information Technology in planning, coordinating, super visioning, and controlling function in ID-SIRTII activity.

VII. Enabling Policies and Programs

For e-government implementation, the government published "Policy and National Strategy on e-Government Development" that poured out in Presidential Decree No. 3 Year 2003. Apparently, the changes in government implementation nowadays to a networking organization system by using information and communication technology, operationally found some obstacle problems. Some of the obstacles are related with government human resources quantity and quality which are really limited and has not ready to receive cultural changes.

According to Re-Registration of Government Employee 2003 conducted by National Government Employee Body, there are 3,648,005 employees with educational background mentioned below:

- Primary School	: 3.4%	- Bachelor	: 27.0%
- Junior High School	: 2.8%	- Post Graduated	: 2.5%
- Senior High School	: 38.2%	- Doctoral	: 0.3%
- Diploma	: 25.7		

From the amount above, the scattered of employee work in territory:

- Java : 48.71%
 - Sumatra : 22.95%
 - Celebes : 10.31%
 - Borneo : 7.33%
- and others in Bali, Lesser Sundas, Molucas and Papua

From the age of employee:

- 18-30 years old : 7.5%
- 30-40 years old : 34.4%
- 40-56 years old : 55.8%
- 57-65 years old : 2.3%

If we looked to the data above, it is so clear that the educational background of government employee in Indonesia majority between Senior High School – Diploma, domicile in Java islands with age range 40 – 56 years old. So it can be calculated, with “average” educational background in general, the ability to do necessity analysis and design it solution based on latest IT development will be limited.

In other side, the concentration of civil employee in Java islands, which as Indonesia’s central government and commerce in general, absolutely it will give impact in dissemination of ICT related resources to other region out of Java that more minim.

With the age of civil employee that quite “mature”, about 45 – 56 years old, of course it will have own preference in determine the policies that will take by the institutions and it will not be easy to convinced with information or other alternative solution, include the one that based on IT. Moreover in local government bureau the information and communication technology were handled, most of all, by echelon II (82%), so access to local government administrations quite difficult.

Meanwhile, Department of Communication and Information Technology already published certain guidance related with the expanding of “e-government” word in Indonesia. There are Government Infrastructure Development Portal Guidance, Making Local Government Website Guidance, Management of Electronic Document System Guidance, and Compose e-Government Development Master Plan Guidance.

VII.1. Nusantara 21 Project

Indonesia has Nusantara-21 project, launched at 1997, it is to make standard national information system to support the superhighway information network. The concept of Nusantara-21 is not about a project that oriented for developing telecommunication infrastructure only. Application aspect which is much related to

information system also plays an important part at that plan. The very wide concept of this project was proven by taking strategic scopes as priority to develop. Thus make this project expand without distinct direction.

Stage plan of Nusantara-21 policies are:

1. Straighten up the special and limited main network
2. Step by step government institution automation realization
3. Spread up the Electronic Data Interchange
4. Developing cross sector integrated ICT
5. Developing cross regional functional ICT
6. Developing ICT special service
7. Developing National Guidance Information System of ICT

But not so long after this project launches, Indonesia had economic crisis that caused damage in every part of the national economics. One of it is the funding concept for Nusantara-21 Project become unrealistic.

VII.2. National Information System

There are unless four National Information System (*Sistem Informasi Nasional - Sisfonas*) main development step that begin in 2002 and will reach the peak at 2010. This National Information System expected to be the next step to e-government implementation. The development of this system includes the leadership factor, brain ware, and regulation. From the techniques aspect it also develops network infrastructure layer, content infrastructure layer, and application infrastructure layer.

From the comprehension above Sisfonas blue print were made up. This blue print expected to be the role model for every information system that develops in government institution. Beside that it also expected to be main standard in business world. One of the main concerns in this blue print is interoperability aspect. In this aspect the things that influence the cooperation process between institute and government institution will be considered. The things that consider in interoperability aspect are: government business process, work scheme, content

management, document management, interoperability information standard, back office application, language, search engine, payment gateway, knowledge management, information scheme analysis.

VII.3. e-Indonesia Initiatives 2006

Taking the e-Indonesia Initiative Conference moments which held in Bandung May 2006, the conference participate extend the e-Indonesia Initiative Recommendation 2006. The conference itself were attended by 500 participates from any circle like academics, practitioner, government, IT observer and entrepreneur.

In coordinate with The Indonesia ICT Institute, National Planning Body, and Department of Communication and ICT, the conference also attended and officially opened by Indonesia Vice President Yusuf Kalla.

Some of important points from that recommendation request the government, in this case the president, to:

- Do initiative and leadership in develop inexpensive ICT infrastructure
- Make Chief Information Officer (CIO) in government institution
- Established the single identity policy as soon as possible
- Organize the regulation, especially which related with Department of Communication and ICT and Ministry of Research and Technology cross sector
- Develop potential local human resources, especially which related and crossed sector with Department of Communication and ICT, Department of National Education, Department of Labor, and Ministry of Research and Technology.

VII.4. Bandung High Tech Valley (BHTV)

BHTV is an acronym for Bandung High Tech Valley. It is an initiative to foster technology-based business and industries in Bandung region. It aims to be the Silicon Valley of Indonesia. Note that the term "Bandung" is not restricted to Bandung city (the capital of West-Java, Indonesia) only, but rather greater Bandung areas.

The BHTV initiative was originated from Ministry of Industry and Trade of Indonesia as a mean to increase electronics export. It was started in 1986, but was forgotten when Indonesia faced economy crisis in 1997. It was then re-started by some people in Bandung Technology Institute (ITB).

Bandung has most of the ingredients to make a successful technology area, because:

- During the Dutch occupation, Bandung was designed to host many government supporting institutions, including research centers. That is why many Government agencies (especially those who are related to technology) have their main office (headquarters) in Bandung.
- Bandung is considered as a student-city in Indonesia. Another city that is similar to Bandung is Yogyakarta. Many students come from various parts of Indonesia just to study in Bandung.
- Some technology companies and research centers run in Bandung include various research centers in universities.
- Bandung is known for its creativity in arts, traditional and modern. Many artists, musicians, bands, painters come from Bandung.

According to Budi Rahardjo, one of the BHTV founder, the only ingredient that is still missing in Bandung is the existence of technology-based multinational company in the region. There are already technology companies in Bandung, but they are not multinational companies. These companies will act as anchors to the environment, keeping talented people (science and engineering graduates) in the region. That is why one of BHTV program is to attract companies to invest in research and development in Bandung.

The main focus of current BHTV initiative is to help small tech companies to start in Bandung. It is mainly done through electronic means. Physical meetings were also carried out, but it is not being done anymore. Another activity is to attract multinational companies to invest in research and development in the region. Talks have been initiated with some big and small companies.



In 2004, there was a BHTV expo, in which 70 companies (mostly in IT) were participated. In February 10, 2006, BHTV Foundation has been legally founded by four ITB faculty members to further oversee the development of BHTV.

VII.5. Indonesian Higher Education Network (INHERENT)

Indonesian Higher Education Network (INHERENT) system development and high education information network program that gradually planned to connect all institute of higher education in Indonesia to be one local point knot. General Directorate of Higher Education (*Direktorat Jenderal Pendidikan Tinggi – Ditjen Dikti*) believe that INHERENT could be use to organize distant learning besides for inter university teleconference. In addition for efficiency, INHERENT also thrift the expense that need to communicate between each other.

To connect the universities in Indonesia, Ditjen Dikti make 32 point knot that connect 32 universities in 30 provinces. One knot represents one city in one province. To establish reliable connection among universities, PT Telekomunikasi Indonesia (Telkom) built and maintains the backbone infrastructure needed under the ‘Smart Campus’ program. Universities that include in this network are the universities which get INHERENT aid from Ditjen Dikti with different nominal.

For sure, the value was above IDR 500 million (USD 50,000) and it was for provisioning device and network supporting. For the university that being the knot gets aid all sorts in device worth IDR 2 Billion (USD 200,000). And so by applying proposal, the campus that selected to make networking content for e-learning needs and so digital library could get IDR 2.5 Billion (USD 250,000) fund.

Beside that, they can share learning method inter university, looking research reference in other university, and also distant learning system. For example, a lecturer in one university could give lecture to another university by teleconference. INHERENT network will be continuously developed to

connecting over 200 universities in Indonesia. Special in Java, connected with STM-1 infrastructure or 155 Mbps speed. Whereas in outer Java connected with 8 Mbps speed. For Papua and Moluccas because of the infrastructure limitation they only connected with 2 Mbps speed.

VIII. Legal Regulatory Environment for ICTs

The first time Indonesian government officially gives attention to ICT (Information and Communication Technology) problem were in President Suharto era. Through the Presidential Decree No. 30/1997 Indonesia ICT Coordination Team (*Tim Koordinasi Telematika Indonesia - TKTI*) were made up in July 1997 with the member consist of 1 (one) Coordinating Minister, 8 (eight) Department Ministers, and 5 (five) State Ministers. At that time TKTI got a long term task to design and implementing Indonesia Superhighway concept which form in Nusantara-21 Project draft.

Alteration of paradigm in Information and Communication Technology (ICT) in Indonesia begin with the alteration of law regulation in telecommunication sector at 1999. Law No. 36 Year 1999 is described as a huge cluster in law sector related to ICT in Indonesia.

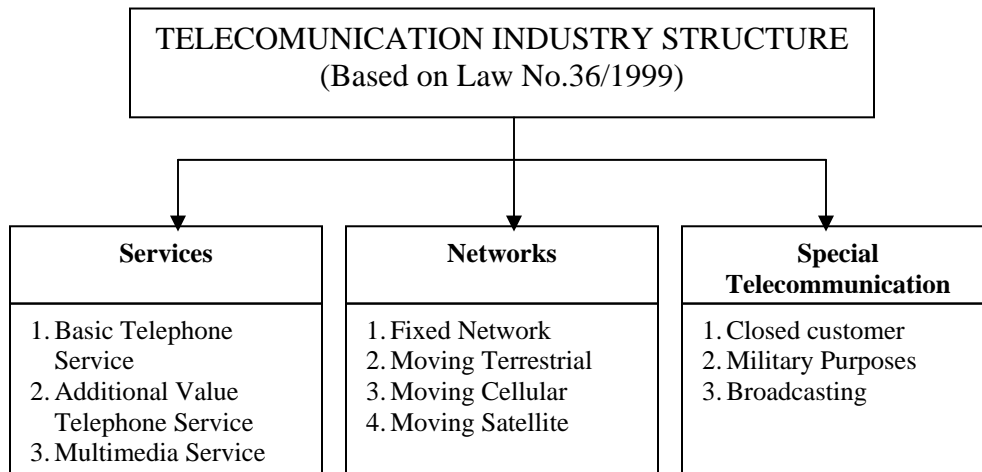


Table 8.0 (Telecommunication Industry Structure. Source: Law No. 36 Year 1999)

Then Indonesian President, Abdurrahman Wahid in 2001 had released Presidential Decree No. 6/2001 about “Information and Communication Technology (ICT) Development and Usability in Indonesia” stating concept of “Government Online” inside. That concept aims increase: good governance, transparency & government accountability effort, citizen participation, public services, and working relation between government bodies. Indonesian President, Megawati Soekarnoputri in 2003 had released Presidential Decree No. 3/2003 about “Policy and National Strategy on e-Government Development”, on July 2003. It aims that government bodies central or local can understand the importance of e-government, strategic aim of e-government, obstacles that can happen on implementing e-government, way of developing, strategy and implementation on developing e-government, nationally or the bodies themselves.

Then, President SBY era, provide with Presidential Decree No. 9/2005 and No. 10/2005 then revised to No. 15/2005, they formed one department for handling information and communication technology sector there is Department of Communication and Information Technology (*Departemen Komunikasi dan Informatika – Depkominfo*).

When opened up the National ICT Conference for Indonesia in May 2005, Susilo Bambang Yudhoyono, President of Indonesia, gave mandate to Depkominfo to make the development of ICT more synergic, efficient and effective through three main pillars: applications, infrastructures, and contents. Because Yudhoyono is so sure that ICT is the pillar for Indonesia nation progress, so it is need participation from all of society to makes use of IT and bring out the concept of smart society so that increase the nation competition power.

The other regulation that significantly related to ICT development is Presidential Decree No. 52 Year 2000 about Telecommunication Service Conduct, and Presidential Decree No. 53 Year 2000 about Radio Frequency Spectrum and Satellite Orbital.

IX. Education and Capacity Building

In 2010 Indonesia needs about 327,813 ICT man powers with market value around USD 1.7 million. According to ICT and Computer Higher Education Association (*Asosiasi Perguruan Tinggi Informatika dan Komputer - Aptikom*), there are about 20,000 ICT graduates every year.

Human Resources Blue Book that published in October 2003 by Bandung Technology Institute jointly with Department of Industry and Commerce, said that chance for ICT and communication production human resources to go abroad till 2015 were about 3.3 million work field. Whereas it will need 327,813 domestic ICT and communication human resources according to projection of CIT industry growth in 2010 with USD 8.2 billion target of production and productivity assume USD 25.000 per person.

General Projection of Indonesia ICT Human Resources Growth

Skilled Manpower						
IT Specialists	7603	10644	16499	27223	46279	78675
Annual Growth	16%	35%	65%	70%	76%	78%
IT Professionals	3807	5322	8249	13612	23140	39338
Production	727.00	1,108.80	1,718.64	2,835.76	4,820.79	8,195.33
Target Administrators	1267	1774	2750	4537	7713	13113
Productivity	25.000.00	25.000.00	25.000.00	25.000.00	25.000.00	25.000.00
Expert Manpower						
IT System Resources Total	3803	5322	8249	13612	23140	39338
IT Databases	2534	3548	5500	9074	15426	26225
IT Application Developer	6336	8870	13749	22686	38566	65563

IT Solution Developer	2534	3548	5500	9074	15426	26225
IT Trainer	1267	1774	2750	4537	7713	13113
Others	2534	3548	5500	9074	15426	26225

Table 7.0 (ICT Human Resources. Source: Blue Book of Human Resources Planning for ICT Industry)

There were various building educations and capacity programs in Indonesia which related with society empowered in ICT matter. Moreover the government made policy about Indonesia National Work Competence Standard (*Standar Kompetensi Kerja Nasional Indonesia / SKKNI*) for ICT field. There are 27 competences were established for computer operator and 91 competences for programmer.

Amount of higher education institution in Indonesia who held education program from Undergraduate to the Doctoral program related with ICT science as described below:

- Doctoral degree : 3
- Master degree : 14
- Undergraduate degree : 572

According to the latest research conducted by Tempo Data Research and Analysis, the top ten universities who held ICT study program for 2006 are:

1. Bandung Technology Institute – Bandung (www.itb.ac.id) / public univ.
2. Bina Nusantara University – Jakarta (www.binus.ac.id) / private univ.
3. Gunadarma University – Jakarta (www.gunadarma.ac.id) / private univ.
4. University of Indonesia – Jakarta (www.ui.ac.id) / public univ.
5. 10 November Technology Institute – Surabaya (www.its.ac.id) / public univ.
6. University of Gadjah Mada – Yogyakarta (www.ugm.ac.id) / public univ.
7. Tarumanegara University – Jakarta (www.untar.ac.id) / private univ.
8. Trisakti University – Jakarta (www.trisakti.ac.id) / private univ.
9. Telkom Technology College – Bandung (www.stttelkom.ac.id) / private univ.
10. Pelita Harapan University – Jakarta (www.uph.edu) / private univ.

e-Learning Joint Content Program

When closing the National Congress Association of Higher Education on Information Technology and Computers (Asosiasi Perguruan Tinggi Informatika dan Komputer - APTIKOM) in Bandung, Saturday, November 25, 2006, there are also few work plans aimed for 2007 resolved to revitalize the role of APTIKOM.

One of the plans is to motivate for the implementation of e-learning. The e-Learning program that synchronized with program that supported by Board of National ICT, that is in e-education. The e-Learning which will be built later, was expected to be a contribution from universities and academic institutions that participate and give the materials which could be accessed by public.

So the academic institutions that are member of APTIKOM were asked their willingness to arrange one subject (minimum) with 3 credits, which will be aired on the Internet, collectively with other subjects from other academic institutions.

That means later on, a student from one university could be taking particular subject which the material was underwent by the other university. And this program was expected to operate on January 2007.

Box / Feature

“Multi Channel Learning” by Bina Nusantara University

Bina Nusantara University (UBiNus) – www.binus.ac.id that located in Jakarta is a university which combines “on campus” and “off campus” method proportionally for its learning system. UBiNus name it with Multi Channel Learning (MCL). Applied since 2002, this MCL method arrange 13 sessions in one semester, four of it do with e-learning. In those four sessions, interaction between the lecturer and student should use Internet, in other words they do not need to come to campus. Basically, MCL is learning empowered through various methods, system, chance, space time, source, and media. Through this MCL system, UBiNus change the conventional study method which was passive to an interactive, proactive, and independent method. The students were possible to access lecture material and discuss with their lecturer or their colleagues as long as they connected with Internet.

The application system, called with Learning Management System (LMS), was developed by UBiNus itself. For better learning system with MCL UBiNus build development networking such as free internet facility for students in area 5 km from campus. They can download their lecture material for free, in condition their residences not more than 5 km far from campus.

As written in **e-Indonesia Magazine** (Volume I, January 2006), around 78% from total subject could access through Internet. UBiNus also facilitated their *Syahdan*

and *Anggrek* campus with hot spot facility so the student could use Internet any where they want without plug in. With just bring PDA or notebook they can download the lecture.

All this facilities are for supporting the MCL system. And in every classroom there are multimedia computer which directly connect to Internet and complete with LCD projector. So, even when we in the classroom the learning process could use any source optimally. On July 25th, 2006, Department of Communication and Information Technology & Bina Nusantara have signed a Memorandum of Understanding (MoU) on the development and implementation of strategic communication and information technology for nation developmental.

X. Open Source & Content Initiative

X.1. Open Source Movement

Indonesia, Go Open Source! (IGOS) movement declared in June 30th 2004 by Minister of Research and Technology, Minister of Communication and Information Technology, Minister of Justice and Human Rights, and Minister of National Education. The aims of IGOS are:

- Spread up the use of Open Source Software (OSS) in Indonesia
- Prepare guideline for the development and the use of Open Source Software in Indonesia
- Motivated to form training center, competency center, and open sourced based business incubator center in Indonesia
- Increase the coordination, ability, creativity, desire, and participation in government and society to use Open Source Software maximally.

Some of OSS socialization, coordination, and implementation under the IGOS umbrella were done by academics, government, businessman, and even public society. Some of OSS applications were build by Indonesian ICT community such as Indonesian Language Windows (*Windows Bahasa Indonesia - WinBi*), BlankOn Linux Distro, IGOS Desktop and Application System, *Waroeng IGOS* for Internet Kiosk Client-Server Application.

X.2. Computer Knowledge for Free

IlmuKomputer.Com (IKC), (*Ilmu Komputer* = Computer Knowledge) is a website that contains free material and lecture with Bahasa in computer and technology information center. Free materials with Open License Content are available in ready to download PDF format and also in CD-ROM format. IKC which born in April 17th 2003 got award from World Summit Information Society (WSIS) as "The 21 Continental Best Practice Examples in the Category e-Learning".

The article filled up involves hundreds of volunteer contributors from all over cities in Indonesia and abroad. Through the internet, contributors sent tutorial/lecture materials, translations, reviews, and various practice tips presented in materials from introductory, general and serial lecturing subject. The type of contributions not only gave written materials but also gave online consultation through Yahoo Messenger and being member of committee in seminars.

X.3. Blog and Blogger

According to Enda Nasution, he already made Google Custom Search Engine that special for looking Indonesian Blogs. He predicted, currently there are around 70 – 90 thousand Indonesian blogs. Enda himself frequently called as Father of The Indonesian Blogger by another Indonesian bloggers.

Absolutely, then there are so many blogger gathered and made their own community. Some of blogs made based on blogger origins, for example Loenpia.net community for blogger from Semarang (Central Java). There also blogger

community that made because using service from the same place, like Blog.Indosiar.com community. Then there is blogger community which the member more wide and vary like BlogFam.com community. Even this BlogFam community had a monthly online magazine that contain certain feature article and interesting interview, addressed in <http://bz.blogfam.com>.

Bloggers in Indonesia were not come from youngster only. Let say like President World Marketing Association 2002-2003 Hermawan Kartajaya. Kartajaya, who also owner of MarkPlus Institute of Marketing in some of Asia country, fill up his blog regularly in <http://hermawan.typepad.com/blog>. Beside that Indonesia government legal officer, Minister of Defense Juwono Sudarsono, also had his own blog in <http://www.juwonosudarsono.com>. Even there is DPR member who also formerly known as Miss Indonesia 2001, Angelina Sondakh, also had blog addressed in <http://angelinasondakh.blogspot.com>. One of Indonesian blogger who also an Indonesia IT journalist from Tempo, Budi Putra, regularly fill up blog in CNet Asia website addressed in <http://asia.cnet.com/reviews/blog/toekangit>.

The dynamics of blog in Indonesia is interesting. Many popular books about technique in making blog had been published. There also commercial books which is the original script were came from a blog's content collection. Mainstream online media detikINET (www.detikinet.com) frequently gathered blogger community; regularly they held some discussion or training for making blog for student, teacher, housewife, even for non-government organization (NGO) activist.

X.4. Thousand Books for The Blinds

“Thousand Books” Project which accelerate by Mitra Netra Foundation open opportunity for everyone who wants to give their strength to retype some of books that circulate in Indonesia, so it can be seen by blind people through Mitra Netra intern Internet. Most of books that retyped by volunteers were popular books.

Now there were more than 280 people joined Mitra Netra Thousand Books. They type the books in their place then send it by e-mail or post service to Mitra Netra. After edited by Mitra Netra Foundation staff, the book directly sends to Mitra Netra internal internet, so all blind people who joined Mitra Netra Foundation can “read” it by hear it using “screen reader” software.

Whoever and wherever they are, they can join to be volunteers through Mitra Netra Foundation official website that is www.mitranetra.or.id. Inside that website there are list of books which already type, had been electronic book (e-book), and books that has not been type yet. The volunteers not just come from Indonesia but also from abroad. They all connected through internet that handles by three Mitra Netra staff that had task to collect the books that already typed.

X.5. National Computer Camp for the Blind

For the first time in Indonesia, a competition on computer for the blinds was held. The competition, which titled "The First National Computer Camp for The Blind" was held by Yayasan Mitra Netra, an organization specialized to help the blindness. As many as one hundred people with sight disability compete to write poetry using Microsoft Word, to count profit and loss by using Excel and also to browse the Internet.

The competition which held on Thursday, November 23, 2006 was placed on the Auditorium Agency of Technology Application and Examination, and each contestant is using notebooks that had software screen-reader Job Access with Speech (JAWS) installed.

For Yayasan Mitra Netra who staging the competition, Indonesian Record Museum (Museum Rekor Indonesia – MURI) gave the record for the competition that greatly participated by blind contestants in Indonesia.

XI. Research and development

Voice over Internet Protocol (VoIP) is one of the most popular ICT research done by ICT community in grass-root level. ICT Center – Jakarta (www.ictcenter.net) which directed by Vocational High School teachers were succeed in implementing Maverick VoIP Technology. This Maverick VoIP soon will be implemented in more than 4,000 schools that already get connected to 24 hours Internet access. Since January 2006 there is almost 9,400 Maverick VoIP registered account and as often as the workshop, demo, and road show in many campus and city this amount keeps increase. Maverick VoIP use Session Initiation Protocol (SIP) technology. Technically this Maverick VoIP technology that can be used free of charge for everyone were easily to interconnected with both of government or private telecommunication network, either fixed phone or mobile phone. Unfortunately, by the Law No. 36 Year 1999, it is still forbidden. Because they who can give the telecommunication service for public officially and legally are they who already get the legal permit from government with all over condition it takes.

In other side, the liberation of using 2.4 GHz from government for WiFi needs also urge the spread up of VoIP activity. The success of liberation of 2.4 GHz in early 2005 was because the struggle of ICT community in Indonesia, especially they who are joined in mailing-list indowli@yahoogroups.com. The motivator in that mailing-list also makes technology creation to reduce the cost of their internet communication. Let say like ‘*wajanbolic*’ and ‘*pancibolic*’ technology, it was making 2.4 GHz antenna using wok or pan which could serve radius 3-4 kilometer with 11-54 Mbps, the cost of provisioning only IDR 350,000 (USD 35).

Then by using RT/RW-net technology, simple term for Metro LAN, investment from each house for access speed 100 Mbps Fast Ethernet only cost IDR 200,000 (USD 20). And now by using WiFi for 24 hours Internet access only cost about IDR 350,000 (USD 35) every month.

Box / Feature

Observing Chili Price in e-Pabelan Telecenter

There are six elucidation telecenter developed by National Development Planning Board (*Badan Perencanaan Pembangunan Nasional - Bappenas*) in coordination with UNDP, in Partnership for e-Prosperity for the Poor (PePP) program. Special for the telecenter that develop in Pabelan had achieved an international award, APEC Digital Opportunity Center Award (ADOC) for ICT Best Practice for Bridging the Digital Divide category in Taipei July 2006.

This telecenter project defeats the same program in Chile, Philippines, Peru, and Vietnam. e-Pabelan Telecenter which established in April 23rd 2004, were information server project coordination between Bappenas and Pondok Pesantren Pabelan. Located in a simple house 7 x 12 meters, the e-Pabelan Telecenter gave Internet facility for farmer.

Ten farmer groups, consist of 15 - 25 farmers each, took turns to use this facility. Each group can use Internet for two hours every ten days. From there farmers could find out what disease that comes in to their plants and how to handle it. And so according to a farmer who used that facility Internet were more honest than information officer. In fact sometimes the information officer bring mission from the medicine producer.

The chili farmers in Pabelan II orchard, Pabelan village, Mungkid sub district, Magelang regency, Central Java also need chili price information. They started to like browsing in Internet. So now they could not easily cheat by broker. Not just

information about chili price. They also can get seeds, planting technique, pest, fertilizer, and even pesticides from Internet.

As written in **Gatra magazine** (No. 38, Year XIII, August 9th 2006), beside farmer group, the Islamic boarding students, called *santri*, of Pondok Pesantren Pabelan also make use this telecenter. For public society the fee is IDR 3000/hour (USD 3), and for farmer group IDR 1000/hour (USD 1). From this telecenter, one *santri* got achievement by claiming second place in application competition held by Microsoft and had a chance to earn training in Korea.

XII. Challenge related to the Indonesia ICT4D

Looking from the amount of citizens that quite huge and compared with ICT penetration rate in Indonesia that still could be grown, it can be sure Indonesia is a prospective market in the future. Even so, according to Economist Intelligence Unit research, in its document titled "The 2005 e-Readiness Rankings", apparently Indonesia is in 60th place from 65 countries that surveyed. Below Indonesia there are Vietnam, Kazakhstan, Algeria, Pakistan, and Azerbaijan.

Some factors that provided as basis in that evaluation are: connectivity and technology infrastructure, business environment, consumer and business adoption, legal and policy environment, social and cultural environment and supporting e-services. Uniquely, although in general there are 5 countries below Indonesia, those 5 countries surpassed Indonesia in Legal and Policy Environment and Social and Cultural Environment.

Talking about upholding legal and policies aspects related to social behavior and ICT cultural user in Indonesia, it will be interesting if we look the result from BSA and IDC Global Software research with topic "Piracy Study" that published in May 2006, once again Indonesia was in uncomfortable place. Indonesia was in the big three country with the highest piracy rate along 2005.

Since 2003, the software piracy rate only decrease 1%, become 87% in 2005. According to BSA the biggest piracy in Indonesia were done in business sector especially Small and Medium Enterprise (SME). Indonesia it self estimated suffered financial lost around USD 280 million every year because of that piracy. Because of the weakness of law enforcement for piracy, Indonesia were include in United States Trade Representative (USTR) priority watch list, so it was little bit hampered the trading to US. That highly piracy rate will always streaks Indonesia in WTO and it is possible for Indonesia get economical sanction because of it.

It is not fair demanding producer or vendor to sell their products with price that is much lower than in thrived country market. But the fact in field shows public purchasing power parity in Indonesia is true much lower if compare with public in thrived country. As a result, internet kiosk which is one of lance tip to increasing ICT penetration in Indonesia also gets impact from it. Internet kiosk frequently accused as a place which thriving in Intellectual Property Right (IPR) violations because the using of pirated software. Of course it was not easy for internet kiosk with the property scale 10 computers to use licensed software, because it is very possible that price of those software equal with the price of computer itself.

The government had belief that internet kiosk play an important role in promoting the internet benefits to public. And the alternative solution based on open source was introduced continuously, but it was not easy to change the behavior of businessmen either the customer. In Presidential Decree No 6 Year 2001 about ICT Development and Usability in Indonesia, the growth of internet kiosk hopefully could widen range and the content of public information service, broaden the medical and education service, develop public service center both in city and villages, and also provide e-commerce service for small and middle enterprises.

In the other hands, Department of Communication and Information Technology on Indonesia Infrastructure Conference and Exhibition (IICE) 2006 on November

2006, said optimistically about the growth of telecommunication teledensity in Indonesia for the next couple years. Up to 2010, the average growth for fixed line is 20.1%, cellular 26.7%, Internet 30.8% and bandwidth 71%.

Telecommunication Access Growth Projection
(assumption, in million)

Type	2005	2006*)	2007*)	2008*)	2009*)	2010*)
Fixed Line (lines)	13.4	14.0	16.2	20.0	26.0	31.2
Cellular (lines)	46.0	66.5	78.5	92.6	105.6	122.1
Internet (user)	20.0	25.0	31.5	50.4	68.7	80.2
Bandwidth (user)	0.2	0.5	0.9	1.6	2.0	2.5

Table 8.0 (Indonesia Telecommunication Access Growth Projection. Source: Department of Communication and Information Technology)

It still need lots of homework from government, businessmen, academism and ICT experts and community in Indonesia to create and implement all program which could directed us to the conducive ICT empowerment and usability in Indonesia. We should agree that, if the ICT business climate in Indonesia would be more conducive, which one of the indicators could be seen from the increasing of "e-Readiness" and the decreasing of "Software Piracy"- the investor both of local and foreigner will invest their capital in ICT sector in Indonesia without any doubt. As a result, the increasing ICT penetration in Indonesia with a high quality and low cost could be materialized soon.

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